
Faculty of Engineering & Information Technology

# Intelligent Personalized Approaches for Semantic Search and Query Expansion

**by**

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**CERTIFICATE**

*I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as part of the collaborative doctoral degree and/or fully acknowledged within the text.*

*I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.*

*This research is supported by the Australian Government Research Training Program.*

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**ABSTRACT**

In today's highly advanced technological world, the Internet has taken over all aspects of human life. Many services are advertised and provided to the users through online channels. The user looks for services and obtains them through different search engines. To obtain the best results that meet the needs and requirements of the users, researchers have extensively studied methods such as different personalization methods by which to improve the performance and efficiency of the retrieval process. A key part of the personalization process is the generation of user models. The most commonly used user models are still rather simplistic, representing the user as a vector of ratings or using a set of keywords. Recently, semantic techniques have had a significant importance in the field of personalized querying and personalized web search engines. This thesis focuses on both processes of personalized web search engines, first the reformulation of queries and second ranking query results.

The importance of personalized web search lies in its ability to identify users' interests based on their personal profiles. This work contributes to personalized web search services in three aspects. These contributions can be summarized as follows:

First, it creates user profiles based on a user's browsing behaviour, as well as the semantic knowledge of a domain ontology, aiming to improve the quality of the search results. However, it is not easy to acquire personalized web search results, hence one of the problems that is encountered in this approach is how to get a precise representation of the user interests, as well as how to use it to find search results. The second contribution builds on the first contribution. A personalized web search approach is introduced by integrating user context history into the information retrieval process. This integration process aims to provide search results that meet the user's needs. It also aims to create contextual profiles for the user based on several basic factors: user temporal behaviour during browsing, semantic knowledge of a specific domain ontology, as well as an algorithm based on re-ranking the search results.

The previous solutions were related to the re-ranking of the returned search results to match the user's requirements. The third contribution includes a comparison of three-term weight methods in personalized query expansion. This model has been built to

incorporate both latent semantics and weighting terms. Experiments conducted in the real world to evaluate the proposed personalized web search approach; show promising results in the quality of reformulation and re-ranking processes compared to Google engine techniques.

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Journal Papers

Elshaweesh , O., Lu,H., Alwedyan ,M ., Chebil ,W, 'Context-Aware Personalized Web Search Using Navigation History'. International Journal on Semantic Web and Information Systems (IJSWIS), Submitted.

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